

# Robot Builder

The Official Publication of the ROBOTICS SOCIETY OF SOUTHERN CALIFORNIA  
Post Office Box 26044, Santa Ana, CA 92799-6044

## PRESIDENTS MESSAGE

by Jess Jackson

The Sojourner robot operating on Mars has had relatively good weather for it's outing on the Red planet. However, it's a bit too nippy at night for my liking but the rover does warm up during the day to scurry about the Martian landscape at the direction of the JPL operators. In contrast to the cool on Mars, Southern California of Earth is now uncomfortably hot in August. Last month I mentioned that Don Golding and Bob Gross were interviewed by the DISCOVERY CHANNEL, WORLD OF WONDER. The program will be shown sometime in the future. I will inform you of the date when it shows. I also found that BEYOND 2000 (Discovery channel) will air a show on space robots, Saturday August 16 and Thursday August 28. AMAZING AMERICA (TLC channel) will air a program on ROBOT WARS, Thursday, August 14 and Saturday, August 16. Later in this message, I give you a table of past robotic presentations or shows. I find that the program information is recycled about every three or four months so if you know what the name of the program is you can search the program guide and possibly catch them again in the coming months.

editor time to publish, print, fold, address and mail your ROBOT BUILDER to you. At this time (two weeks early) the program is not complete but the tentative schedule for the August 9 meeting will be as follows:

12:30 - RSSC business meeting (short one)

1:00 - General meeting (needs to start immediately)

### Topics

Infrared detectors to identify a person

Long range Video transmission from a small robot

More discussion about new book "Practical Robotics"

Open forum discussion of problems and membership projects.

Recent Small Robot developments

3:30 adjourn

Remember the 68HC11 SIG (Special Interest Group) meets at 9:00 in the Robot Lab (room 301) in the CS building just east of engineering building.

I have to write this message about two weeks early to give our

(continued on page 2)

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### Faire Committee Meeting

Date: August 9

Time: 11:30 a.m.

Place: CSUF EE 321

### Sixth Annual Robot Fair

Saturday

September 6, 1997

California State University Fullerton

Presidents Message (continued from page 1)

program name	channel	subject
BEYOND 2000	DSC	Robot vacuum cleaner
FUTUR FANTASTIC WK	DSC	I,ROBOT- robots evolving
DISCOVERY MAGAZINE	DSC	See how they run- robots that can leap
DISCOVERY MAGAZINE	DSC	Survival- indestructible machines
POP-SCI	DSC	Bomb Squad and robots
WORLD OF WONDER	DSC	Flying robots tackle tuff assignments
WORLD OF WONDER	DSC	Robot Athletes
NEXT STEP	DSC	Cyborgs
NEXT STEP	DSC	Future Weapons -(some robots)
NEXT STEP	DSC	Robot Wars

NEXT STEP	DSC	MIT Inventors - will change the way we live
NEXT STEP	DSC	Unmanned Spy Plane - Predator, robot spy plane
HOW'D 'DO THAT	TLC	Episode 12 - prosthetic robot technology
ULTRASCIENCE	TLC	Android
ULTRASCIENCE	TLC	War 2020
DANGER ZONE	TLC	Land Mine Remover robots
DANGER ZONE	TLC	San Diego County bomb squad- 300 per year
SCIENCE FRONTIERS	TLC	Weapons of War - Non lethal Weapons
SCIENCE FRONTIERS	TLC	Dr Satan's robot
See you at the meeting. . . . . JJ		

## On a Roll: Robot Attempts Desert Voyage

R. Monastersky - Science News June 21, 1997

When a burly four-wheel-drive vehicle set off across Chile's Atacama Desert this week, its driver was nowhere in sight. The semi-autonomous rover, called Nomad, takes its marching orders from engineers and members of the general public sitting thousands of kilometers away in North America. Moving at less than 1 mile per hour, the robot is a prototype of the kinds of planetary explorers that may gather Martian rocks in the next century or hunt for meteorites in Antarctica, says William "Red" Whittaker, whose team developed the rover at Carnegie Mellon University in Pittsburgh. Nomad's 6 week journey comes at an auspicious time, overlapping with the Mars Pathfinder mission, which is scheduled to touch down on the Red Planet with its own small rover on July 4.

Whittaker chose the Atacama Desert for testing Nomad because the region has virtually no vegetation and a landscape similar to that of the moon or Mars. "The Atacama Desert is the place on Earth most like another planet", he says.

Funded mostly by NASA, the Nomad project has a goal of traversing 200 kilometers of desert terrain with the robot under remote supervision. Roughly the size of a compact car, the rover's large aluminum wheels can turn independently and extend out from the chassis for added stability on uneven terrain. It has three sets of stereo cameras in front and a 360 degree panoramic camera that enables remote drivers to see all around the robot.

While visitors to the Carnegie Science Center will be able to pilot Nomad, others can track its progress over the World Wide Web at <http://img.arc.nasa.gov/Nomad/nomad.html>

and at  
<http://www.ri.cmu.edu/atacama-trek/>

Scientists at the NASA Ames Research Center in Mountain View, Calif., plan to spend a week testing Nomad in three mock missions designed to simulate rock collecting on Mars, long distance exploration on the moon, and meteorite collecting in Antarctica. Within the next 2 years, the Carnegie Mellon team plans to take Nomad on a meteorite hunting trip in Antarctica to determine whether the robot can detect buried meteorites that get overlooked by human collectors, says Whittaker.

Veteran Antarctic researchers, however, are not holding their breath. When Whittaker last brought a robot to Antarctica, in 1992, the eight-legged machine called Dante walked only a few steps before it was crippled by a broken fiber-optic cable.

Ralph Harvey of Case Western Reserve University in Cleveland, who has spent 21 field seasons searching for meteorites in Antarctica, says that robots could help in limited ways. "A robot can work on days that would make a human feel pretty uncomfortable, such as when the winds get above 20 knots and the air temperature drops below 20 below zero.

In better weather, though, robots will not be able to match humans' ability to pick out the few meteorites amid the thousands of terrestrial pebbles in many locations. "There is simply no tool for finding meteorites as good as the human brain and eye", says Harvey.

*(A large number of photos and renderings are available at the two WWW sites mentioned in the article, The nasa site seems to be hardware/tech oriented and the cmu site has a people slant -ed.)*

## Impressive Japanese Bipedal Robot

Submitted by Henry Arnold

Some of you may have seen the brief news reports about this advanced biped robot. It was developed by Honda Corporation in Japan. The television news clips showed it climbing stairs and pushing a cart. It was also reported that it is able to resist someone pushing it over by balancing itself. I found the following description and pictures at:

<http://robby.caltech.edu/~kajita/honda.html>

### HONDA Develops Surprisingly Advanced Biped Robot!

On December 21st, 1996, Asahi, Yomiuri, Mainichi and other major newspapers in Japan reported a highly advanced human like robot

Developed by researchers in Honda Motor Co. Inc. Japan.

The robot has following remarkable features.

Human-like configuration with a pair of arms and a pair of legs.

Height 180cm, weight 210kg.

Cameras in its head.

Self-contained, using onboard battery, it can move for about 15 minutes. Versatile biped walk. It can walk sideways and backward, and can make turns. Moreover it can walk up/down on stairs and sloped floors. Robust biped walk. =

The robot can maintain its balance autonomously even pushed from outside. When the pushing force is very large, it keeps balance by sitting down.

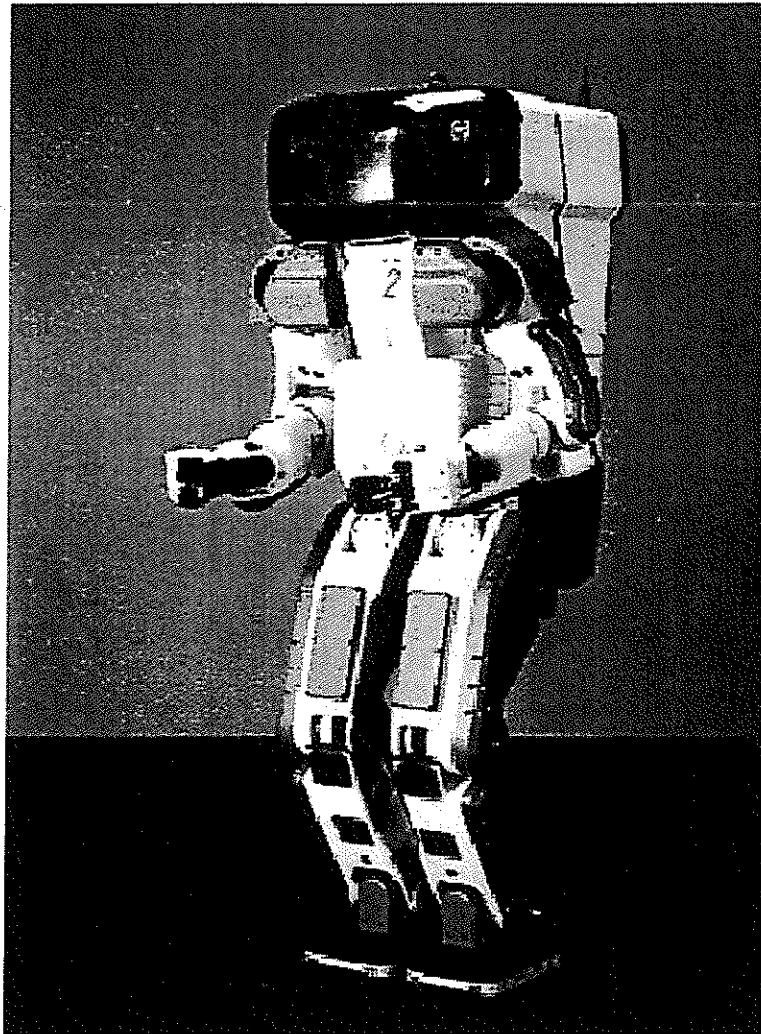
Walking speed and direction can be remotely controlled by radio link, using its two arms, it can demonstrate pushing a cart and fastening bolts (teleoperation mode).

You can also download videos of the robot walking from the following site. Unfortunately the site text is in Japanese so the above site is the only English description I could find.

<http://www.honda.co.jp/tech/other/robot.html>

*(There is a current thread in comp.robotics.misc newsgroup that gives a translation of the news release.*

*Our apologies to Henry, he also sent a drawing with this submittal which we not able to decipher. ed)*



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## RSSC History – Five Years Ago

Tom Thornton

Robot Builder Editor Scott MacGillivray announces his departure. He'll be sorely missed. Scott has plans for moving out of the area. We wish him well where ever he lands.

President Jerry Burton announces the eminent arrival of the First Annual Robot Faire. Yes, August 2 is just around the corner and it's Faire Time.

Contest Rules – a) MicroMouse b) Push Off – a SumoBot variant, c) Slalom d) Take the Money – a voice controlled bot (very tough)

e) Robot Laser Wars f) Design and Demo Projects.

JPL developed a high-clearance six-wheel suspension. The inter-wheel linkages are above the wheels instead of at axle level.

*Does this look familiar? It should, it's a copy of last months "History" column. Back in 1992 the July and August issues of The Robot Builder were combined to make time for First Annual Robot Faire. ed.*

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## Platforms Bow for Robotics Research

R. Colin Johnson

submitted by Tom Carroll

Electronic Engineering Times July 28, 1997

STANFORD, CALIFORNIA – Applied AI Systems Inc. demonstrated an array of robotic platforms here this month at Stanford University's Genetic Programming Conference. Researchers investigating hardware autonomous agents can choose from among walking, wheeled or track-driven robots, each with its own on-board microprocessor and inter-robotic communications system.

"In providing artificial-intelligence solutions to our government and industrial contractees since 1983, we gained expertise in neural learning and behavior-based robotics which we have incorporated into our robotic platforms", said company president Takashi Comi.

Applied AI Systems is not a manufacturer; rather, its machines are added-value versions of devices available elsewhere.

One such machine is the tiny 55 mm diameter Khepera robot. The Khepera stands only 30 mm high and weighs just 70 grams, but it comes with a 68331 microprocessor, RAM, ROM, two dc motors (one for each of its two wheels) and sufficient battery power to run untethered for about half an hour before it needs to look for a recharge station.

Sensor Turrets

Special sensor turrets are available for the tiny robot, including one for robotic vision. Inter-Khepera communications are handled by an infrared communications link.

Also new is a six-wheeled robot, called the Koala, that offers compatibility with agent software written for Khepera. The 3 kg Koala measures 32 cm square by 20 cm high but uses the same microprocessor and communications scheme as the Khepera.

Koala has six stepper motors – one for each wheel and 16 built-in infrared sensors for determining proximity. A larger battery pack than the tiny Khepera can manage keeps Koala running autonomously for up to 3 hours.

For legged-robotic research, Applied AI Systems offers four six legged platforms. The newest, Hermes, uses a 68332 processor with 1 Mbyte of non-volatile memory and a high-resolution CCD camera built-in.

Attila, a six legged device that Comi said is employed by NASA researchers, adds 150 sensors plus a Gyro stabilizer to its CCD camera. And Genghis, a highly dexterous walker, includes built-in proximity sensors, surface contact sensors and an inclinometer for determining how steep a climb is.

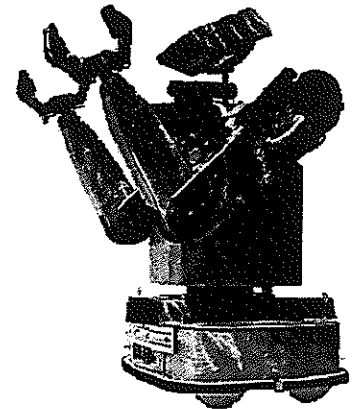
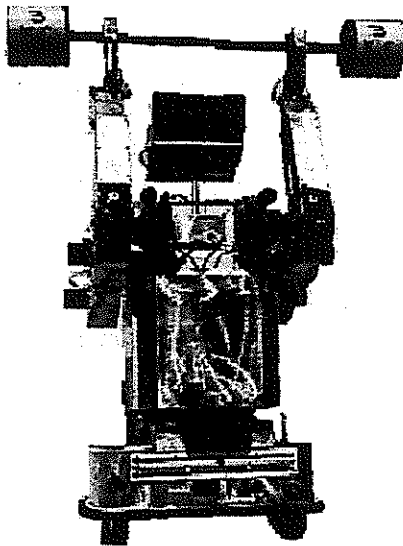
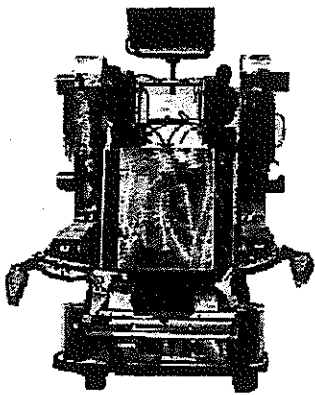
The Nexes walker also uses a 68332 but adds a pannin "head" complete with insect-like "mandibles".

Applied AI Systems also offers robotic platforms with wheels and tank-like tracks.

## Roger Santerre's Robots

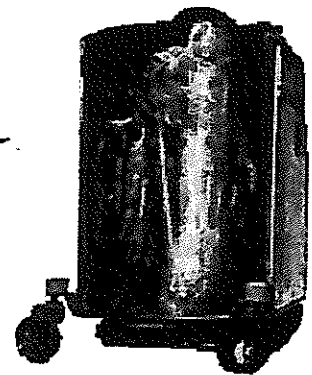
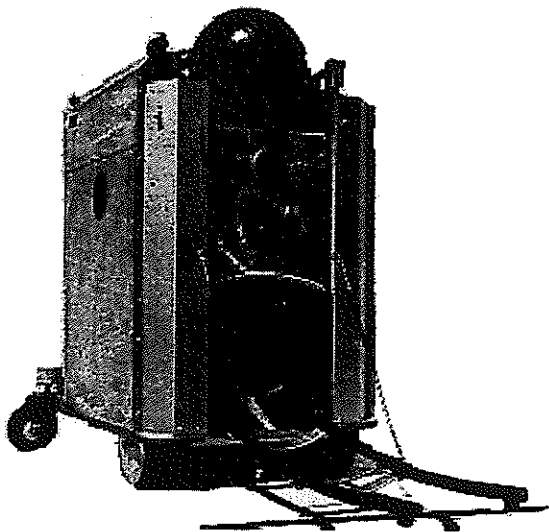
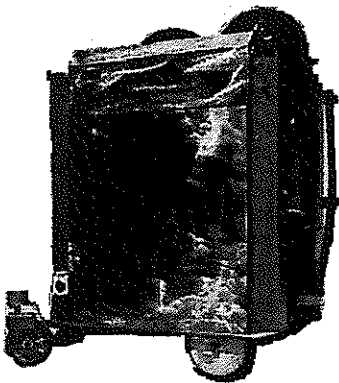
TRB Staff (photos submitted by RSSC member Roger Santerre)

### RONARDO



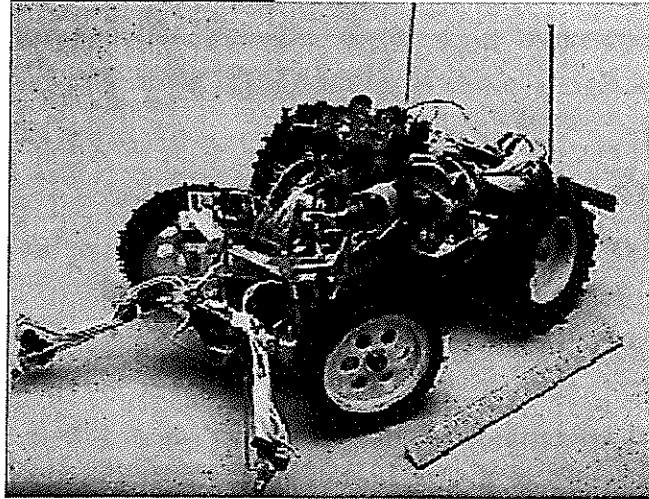
Nothing like a little workout before breakfast to work up an appetite.

### ROBOWL



## Tooth

TRB Staff



Tooth originally was an acronym, but no one can remember what the letters stood for. In reality it was named "Tooth" because it was so much smaller than FANG. Tooth was built in 1989. It has two Motorola 68HC11a processors. The processor boards are the same that were used in the 1989 robot olympics held at the MIT AI lab during IAP. Tooth could do an entire Mars Rover Sample Return Mission -- with a few simplifying assumptions. Tooth could only run on flat surfaces, and could only pick up rocks that looked like and had the same weight, as styrofoam coffee cups covered in black electrical tape. But given those conditions, Tooth would hunt out the "rocks" and bring them back to a central point marked by a light bulb. Tooth was used successfully to help start NASA's micro-rover program.

Some of the people that helped build and program Tooth are: Colin Angle, Erann Gat, John Loch and David Miller.

## News Bytes

TRB Staff

Cyber Times 4-97

Adaptive optics technology combines powerful lasers, high-speed computers, active mirrors that can rapidly alter their shape, and Wake Forest University professor Robert J. Plemmons' problem-solving mathematical algorithms to RECONSTRUCT IMAGES DISTORTED by Earth's atmosphere. By analysing light returning from bright stars such as Vega or artificial stars created by shining a laser into the night sky, scientists can diminish the distorting effects of Earth's atmosphere. Why? Ground-based telescopes can see 50 to 100 times more detail and laser-guided weapons are better able to zap enemy missiles. No fewer than 10 telescopes are adding adaptive optics systems to improve their view, including what is now the highest-resolution telescope on Earth: the US Air Force Phillips Laboratory's 3.5-meter, \$27 million instrument at the Starfire Optical Range in New Mexico. The telescope can track softball-sized objects travelling 1,000 miles above the surface. Plemmons' algorithms, developed in more than 25 years of research for the US Defense Department, are also being used to overcome wind, hot air and other atmospheric turbulence that could affect the aim of the US Air Force's \$1.1-billion Airborne Laser Weapons System, designed to fire a laser through the nose of an aircraft to knock out enemy missiles. It would also help the US Air Force keep better tabs on spy satellites or protect space shuttle crews and satellites from orbiting space junk.

Cyber Times 6-97

Integrated circuits are literally taking on a new life at Department of Energy's Oak Ridge National Laboratory, where researchers have developed a half living, half silicon chip to detect pollutants, explosives and a number of chemicals in soil and water. The bioluminescent bioreporter integrated circuit, dubbed 'CRITTERS ON A CHIP', consists of living sensors - such as bioluminescent bacteria - placed on a standard integrated circuit, or chip. In the presence of targeted substances, including pollutants and explosives, the bacteria emit a visible blue-green light. An integrated chip-based approach with living organisms could dramatically advance the ability to sense a variety of chemical agents in the environment, such as chemical warfare agents. The lab's instrumentation and controls division expects the chip to cost less than \$1 apiece to mass produce. Other potential uses for the chip, which can be designed to transmit a signal to a receiver that's connected to a computer, include medical diagnostics and industrial process monitors. The critters chip is small - 2mm x 2mm and about a half millimetre thick - and can be produced using standard integrated circuit manufacturing processes.

Membership / Renewal Application:

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Home Phone (    )                      -                      Work Phone (    )                      -

Annual Dues: Newsletter & Membership (\$20)

Check #

Area(s) of Interest / Background

Return To: RSSC  
Post Office Box 26044  
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How did you hear about RSSC?

The Robotics Society of Southern California was originally formed in 1989 as a non-profit experimental robotics group. The intent was to establish a co-operative association among related industries, educational institutions, professionals and particularly robot enthusiasts. Membership in the society is open to all with an interest in this exciting field.

The primary goals of the society are to promote public awareness of the field of experimental robotics and encourage the development of personal and home based robots.

The RSSC publishes this monthly newsletter, The Robot Builder, that documents various Society activities, robot construction projects, and other information of interest to members.

### Robotics Society of Southern California

- President**                      Jess Jackson
- Past President**                      Tom Carroll
- Vice President**                      Henry Arnold
- Secretary**                      Joan Jackson
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- Member-at Large**                      Jerry Burton

The Robot Builder is published monthly by the Robotics Society of Southern California.

The yearly membership fee includes a subscription to this newsletter and is available for \$20.00.

Membership applications should be directed to:

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Manuscripts, drawings and other materials submitted for publication that are to be returned must be accompanied by a stamped, self addressed envelope or container.

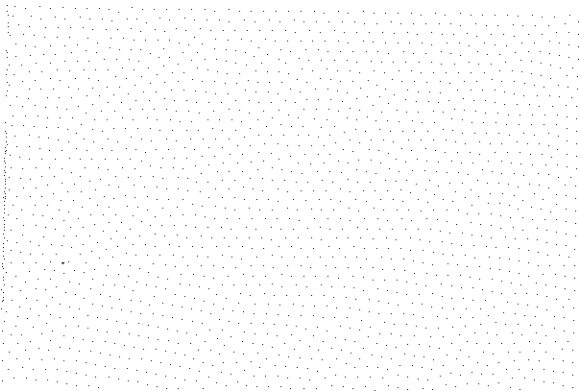
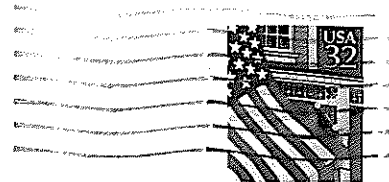
However, RSSC is not responsible for unsolicited materials.

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Tom Thornton - Editor

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